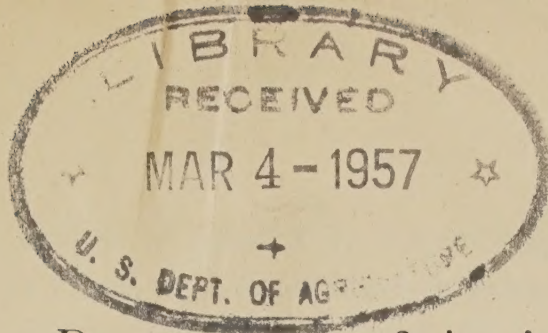


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B. P. I.—144.

S. P. I. D.—46.

United States Department of Agriculture,

BUREAU OF PLANT INDUSTRY,

Seed and Plant Introduction and Distribution,

WASHINGTON, D. C.

DISTRIBUTION OF THE WILLITS CITRANGE IN 1905.

In the course of the experiments conducted by the Laboratory of Plant Breeding of this Bureau, under the direction of the Chief Pathologist and Physiologist, several new hardy citrous fruits, or *citranges*, have been produced, which are believed to possess special value for general cultivation in the southern section of the United States.

Cooperative arrangements were made by which the trees of the new varieties are to be distributed through this Office, and Dr. Herbert J. Webber, Physiologist in Charge of the Laboratory of Plant Breeding, has prepared this circular especially to accompany the trees of the Willits citrange.

A. J. PIETERS,
Botanist in Charge.

Approved:

B. T. GALLOWAY,
Chief of Bureau.

WASHINGTON, D. C., *February 25, 1905.*

DISTRIBUTION OF THE WILLITS CITRANGE.

ORIGIN AND DESCRIPTION.

For several years the Department of Agriculture has had in progress experiments in the production of hardy frostproof oranges. The Trifoliolate orange, which is grown extensively as a hedge plant in the southern United States, endures cold winters without injury as far north as New York. The fruit of this orange is small, very acrid, gummy, seedy, and inedible. In the course of the experiments this hardy species was crossed with the ordinary sweet orange with the object of producing hybrids combining the hardy, cold-resisting character of the Trifoliolate species with the desirable fruit qualities of the sweet orange. From the numerous crosses made by the writer in conjunction with Mr. W. T. Swingle, of the Department of Agriculture, a number of hybrids were produced and several of these which have been grown and tested give evidence of being of considerable value. These new hybrid fruits are very different from the orange, lemon, lime, or other member of the citrus family and have been named citranges. One of these new varieties of citranges, which is a hybrid of the Trifoliolate orange used as the mother parent, with the common orange used as the father parent, has, with the approval of the Secretary of Agriculture, been named "Willits," in honor of the first Assistant Secretary of Agriculture, Hon. Edwin Willits.

A technical description of the Willits citrange follows:

Fruit compressed, spherical or nearly round; small, from $1\frac{3}{4}$ to $2\frac{3}{8}$ inches in diameter and from $1\frac{1}{2}$ to 2 inches in height; color from cadmium yellow to orange; surface rough, with deep depressions over the largest oil glands and with more or less pronounced furrows or ridges running from base to apex; weight medium, about the same as water or somewhat lighter; calyx persistent, with large and fleshy lobes; rind thin, one-eighth inch in thickness, and tender, not adhering so close to fruit as in the Rusk citrange; pulp translucent, light lemon yellow, resembling the ordinary lemon; segments 6 to 10, separated by thin, tender membranes; texture of fruit very tender, being equal to that of the best lemon; axis small, about one-eighth inch in diameter; flavor sprightly acid, similar to lemon, with very slight bitter taste of Trifoliolate orange; nearly seedless, averaging about one seed to four fruits; aroma mild and pleasant, combining the aromatic resinous odor of the Trifoliolate orange with the very delicate odor of the common orange. Trees similar to Trifoliolate orange, vigorous and hardy, evergreen, or semi-evergreen; medium height and shapely; foliage dense, leaves trifoliolate and larger than those of the ordinary Trifoliolate orange; season of maturity very early, from September to the last of November.

The Willits citrange makes a beautiful, vigorous-growing tree and gives evidence of being of value as a decorative or lawn tree. The fruit makes a fine drink, similar to lemonade or limeade, and will be found pleasant as an acid fruit to eat with sugar. It is an excellent substitute for the lemon to serve with fish or oysters and is useful for culinary purposes, for which its seedlessness renders it specially valuable. The products made from the Willits citrange are very different in flavor from those made from the Rusk citrange. They possess more nearly the character and flavor of those made from the lemon.

HARDINESS.

The tests made of the Willits citrange indicate that it is much less susceptible to injury by cold than the ordinary orange. Young trees in northern Florida have endured severely cold weather when the thermometer registered from 15° to 18° F. without losing their leaves. At the Alabama Experiment Station the Willits citrange survived a temperature of about 9° F. in December, 1901, without serious injury. It is believed that the trees can be grown without protection in South Carolina, Georgia, northern Florida, Alabama, southwestern Tennessee, Mississippi, Louisiana, eastern and southern Texas, southern Arkansas, southern Arizona, southern New Mexico, and the warm regions of low altitude in California, Oregon, and possibly Washington. The distribution of the stock of this variety by the Department of Agriculture will be limited to these sections.

CULTIVATION.

The Willits citrange is not recommended for commercial cultivation on a large scale. While the fruit is of undoubted value, it does not compare in quality with the fine oranges of Florida and California, and is to be classed more nearly with the lemon than with the orange. It will more nearly take the place of the lemon and lime than the orange, and its greatest value will probably be for cultivation as a fruit for home use. A few trees grown in the yard will furnish sufficient fruits for the family, and as the period of ripening extends from September 1 to December, they will probably prove valuable additions to the fruits ordinarily cultivated.

The trees for distribution are budded on hardy Trifoliate orange stocks. The buds were inserted low on the stocks and the point of union of the stock and scion can in most cases be distinguished about 3 to 6 inches above the roots.

No special soil can be recommended at present for the citrange, as our experiments with the variety are as yet too limited. The soil should be fairly high and thoroughly drained.

In planting, follow the ordinary practice employed with other fruit trees, such as peach trees, pear trees, etc. The tree of the Willits citrange grows to a height of from 15 to 20 feet or more, with a top from 10 to 12 feet in diameter.

In most soils the trees must be manured if they are to give satisfactory results. Citrous fruits in general require a fertilizer high in potash content. The ordinary orange tree fertilizer contains from 3 to 4 per cent of ammonia, 5 to 6 per cent of phosphoric acid, and from 10 to 13 per cent of potash. The citrange should probably be cultivated in general about the same as peach trees, pear trees, or orange trees.

Ordinarily citrous trees are not pruned, except when young to guide and shape the first growth. It is believed that very little or no pruning will be necessary with the citrange.

The trees distributed are buds from seven to eight months old, and if they receive proper care they should produce their first fruit in from three to four years after planting.

REPORT OF RESULTS DESIRED.

The cultivation of the citrange is as yet experimental, as the fruit is new and comparatively untried. The extension of the cultivation of the different varieties and the results obtained with them will form an interesting item in the annals of American horticulture. It is earnestly urged that all persons who receive the trees give them special care. A record will be kept by the Department of Agriculture of the name and address of every person to whom stock is sent and in due time reports will be requested from each one on the condition of the trees and the results obtained. The trees sent out are of considerable value in view of their limited number and the fact that stock of these trees cannot be obtained elsewhere. Persons who receive trees are urged to aid the Department in introducing and establishing the variety by making notes on the trees as to hardiness, behavior under methods of fertilization and cultivation given, character of soil, and value and uses of the fruit, etc., and be prepared to furnish the Department with a careful record in regard to the results obtained.

PUBLICATIONS ON THE CITRANGE.

Detailed reports have been prepared giving an account of the experiments which lead to the production of the Willits citrange and containing colored and photographic illustrations of the fruit and tree. As soon as these reports are printed, copies will be sent to each person who has received trees of the variety.

HERBERT J. WEBBER,
Physiologist in Charge of
Laboratory of Plant Breeding.

Approved:

A. F. WOODS,
Chief Pathologist and Physiologist.